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Title : Multilayer sheets made of paper or the like with cavities to take substances preferably in powdered form and processes for the manufacture of such multilayer sheets

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Multilayer sheets made of paper or the like with cavities to take substances preferably in powdered form and processes for the manufacture of such multilayer sheets.

Description

For many applications, for example for cleaning or polishing, and also for cosmetic applications sheets or the like made of paper, pulp, fabrics, etc. are impregnated or saturated with appropriate substances which in use support the cleaning, polishing or other actions to be carried out with the corresponding sheets or which represent the actual agent intended for the application.

The substances used for this are either liquid or dissolved or suspended in liquids, where the liquid fractions evaporate partially or completely after impregnation.

The use of dry, fine-grained or powdered substances is not possible in the manner described as in the dry state they do not adhere sufficiently to the sheets and would be mostly lost by turning into dust before use.

The subject-matter of the present invention is multilayer sheets which have cavities between the layers in which preferably dry fine-grained or powdered substances are stored. The sheet layers which seal off the cavities from the surface are formed in such a way that they are damaged during use and thus release the substances stored in the cavities.

In this manner it is possible to hold powdered substances ready for use in multilayer sheets made of paper, pulp, etc., and the sheet holding the substance in question serves the use of the powdered substance, for example for application on surfaces, for grinding, smoothing, cleaning, polishing, etc.

Examples of the powdered substances which can be used are : fine-grained abrasives, polishing agents, powders for cosmetic or medicinal purposes, etc. A particular area of application is treatment of the skin and bodycare. The multilayer sheets as substance carriers then usefully consist of soft papers, pulps or the like, as known in the form of handkerchiefs, nappies, etc. The substances stored between the layers in these areas of application are preferably powders for skin care, which can have

disinfectants, deodorisers or perfuming agents added. These multilayer sheets can be designed as pads for hospital beds, nappies for babies, make-up towels, etc. or as toilet paper. In the latter case the use of healing powders or the like can offer special advantages, for example in the case of haemorrhoids, wounds (intertrigo), etc. In the care of patients, easily changed pads in a design according to the present invention are of great value in the case of patients at risk of pressure sores.

The fact that appropriate selection of the materials of the layers means that the smell of substances with strongly smelling ingredients (for example disinfectants) remains encapsulated until the time of use is particularly worthy of note.

As an example a multilayer sheet according to the present invention is described which consists of at least two layers of paper or the like, and which contains a powder with medicinal or cosmetic properties in cavities between the layers. Such a sheet can be used for example as toilet paper or the like.

Figure 1 shows as an example a partial cross-section through such a multilayer sheet consisting of two layers of paper. One of the two paper layers (1) preferably with greater strength is attached securely to a second paper layer (2) preferably with less strength in the surface areas (3) by adhesion, moulding, or the like. Between these areas the layer (2) for example contains moulded burls (4). The cavities (5) formed by these burls contain the substance, preferably in powder form.

Figure 2 shows the surface according to fig. 1 in plan view.

Figure 3 shows another surface plan view, to which the cross-section according to fig. 1 also applies. The round burls (4) are in this case for example elongated ribs which may have breaks (6) along their length.

Figure 4 represents a different embodiment in partial cross-section. The less strong layer (2) is here attached to the stronger layer (1) at the areas (7) in such a way that cavities (8) are created which have a larger superficial extent than the connection areas (7).

In figures 5 and 6 two examples of the embodiment according to Fig. 4 are shown in plan view. The connection areas (7) in which the layers are connected firmly together are hatched. They divide the surfaces like a honeycomb or similar, while the cavities (8) have a flat cushion shape.

Figure 7 shows in partial cross-section that all the embodiments described according to figures 1 to 6 can in principle be produced conversely, so that the layer with the greater strength (1) has the moulding which forms the cavities while the layer with less strength (2) is a plane. Naturally, both layers can be moulded at the same time so that some of the cavities are formed in the upper layer and some in the lower layer. It has also been considered in special cases to give both layers moulding in such a way that some of the cavities are in the upper layer while the others are in the lower layer.

For all the embodiments described as examples the following applies for their use :
A powder has to be rubbed into an area of skin on the body, for example. The powder is contained in the multilayer sheet being used, in the cavities (5) or (8). The multilayer sheet is placed with the upper layer (i.e. the less strong layer) on the area of skin and is applied with a rubbing movement with gentle pressure. This tears open the upper layer, predominantly in the areas containing the cavities. The powder escapes from the cavities and as a result of the movement is spread over the whole surface of the upper layer and distributed finely over the area of skin being treated, without the loss of substance which is unavoidable when the powder is sprinkled on in the usual manner. This also prevents powder reaching areas where it is not wanted (e.g. clothing).

The materials for the lower layer (1) and for the upper layer (2) can be selected as required within wide limits and adapted to the individual purpose. Different layer materials can also be combined together.

Also the multilayer sheet can consist of more than two layers, so that several layers of cavities are formed. The cavities lying in different layers can be filled with substances of different kinds. During use, one upper layer after the other tears and so the different types of substances stored are exposed and take effect one after the other. In this way

it is also possible to store separately in the multilayer sheet one or more different substances which should not be mixed together until the point of use.

The lower layer (1) with the preferably greater strength can be combined with one or more upper layers (2) which will be extensively eroded during use, whereby the erosion product (preferably of a fibrous structure) is mixed with the substances released from the cavities and is included in the use.

Appropriate selection of the layer materials makes it possible for the cavities, or some of the cavities, to be filled with substances with a liquid or paste consistency. Especially in the case of multiple layers of cavities this gives many possibilities for the formation of mixed products.

Process for the manufacture of multilayer sheets of the type described.

The processes for the manufacture of multilayer sheets of the type described form an integral part of the invention.

The manufacture can be carried out in individual sheets of a suitable format. In many cases manufacture in "continuous" runs will be more advantageous.

In principle, the manufacturing process is divided into three main operations :

a. Moulding or similar of one or more single layers (e.g. moulding or pressing of burls, ribs, honeycombs).
b. Filling of the hollows formed by the moulding or pressing with the substances intended for the purpose in question.
c. Binding together the surfaces of the individual layers by adhesion, stitching, moulding or the like.

These three operations can be carried out consecutively using appropriate equipment. But all three operations can be combined into one operation with special production equipment.

To give a clearer view, the production operations will be described below individually, and a combination of several operations will only be mentioned in special cases.

There is no need for a description of the production operation under c. as these are known processes.

Figure 8 shows diagrammatically an example of moulding of a strip intended as the upper layer (2). This runs from the supply reel (9) between the moulding rollers (10) and (11) with positive and negative moulding profile.

Figure 9 shows diagrammatically a moulding process by the vacuum method. The strip (2) is fed into the mould (12) by intermittent feed. The mould is connected to a vacuum tank (13) and a vacuum pump which is not shown. Between the tank and the mould there is a valve (14). After completion of each intermittent feed stage this valve is opened briefly. The resulting stream of air through the mould (12) to the tank sucks the strip to the intended areas of the mould.

Figure 10 shows how the moulding process according to fig. 9 can be combined with the filling of the hollows created. There is a supply vessel (15) above the mould (12) which contains the substance (16) to be fed into the cavities. At each moulding suction step a specified quantity of substance is conveyed into the moulded hollow at the same time so that the strip (2) leaves the equipment with the hollows already filled.

Figure 11 shows a moulding process (diagrammatic) with compressed air. In this case compressed air with filler substance is intermittently forced into the mould (19) with the mating shape (18) through the compressed air container (17) with filler substance by operation of the valve (20), achieving the same effect as in fig. 10.

Figure 12 shows diagrammatically a process for filling existing hollows in the strip (2). The strip is passed continuously beneath the supply vessel (21). The filler mass (16) flows from this vessel on to the strip and is scraped off by the brush or blade (22) positioned after it, so that only the filling (5) remains in the hollows.

Figure 13 shows another process where for example the combination of several manufacturing steps is represented. The strip (2) coming from the supply reel (9) runs continuously (or intermittently) beneath the supply vessel (22). The dosing device (23) is preferably driven synchronously with the strip and distributes individual portions (24) on the strip (2) in predetermined quantities of the filler mass (16). The strip provided in this way with filler mass then passes between the rollers (25) and

(26). The roller (25) here is for example a smooth roller with a hard surface, while the roller (26) has a softer coating (27) around it. In the rolling process the portions (24) of the filler mass distributed on the strip (2) are pressed into the soft roller together with the corresponding points of the strip (2). Thus the hollows are filled at the same time. The other strip (1) runs from the supply reel (28) and between the rollers (25) and (26) at the same time as strip (2). During or immediately after the rolling process, a device not shown here firmly connects together the strips (1) and (2) in the areas between the hollows.

Figure 14 shows another process where the combination of the moulding and the filling of the hollows in strip (2) is represented. The positive moulding roller (29) jointly with the negative moulding roller (30) produces the hollows in the strip (2), coming from the supply reel (9). The roller (30) is formed as an electrode in such a way that the areas to be filled with the mass (16) are conductive and the other areas of the surface are non-conducting. The high-voltage device (31) transports the filler mass from the supply vessel (32) on to the strip (2) by electrostatic transmission. The electrostatic process can also be used in a similar way for example to apply the filler mass in conjunction with another of the manufacturing processes described here.

Multilayer sheets made of paper or the like with cavities to take substances preferably in powdered form and processes for the manufacture of such multilayer sheets.

Claims

1. Multilayer sheets made of paper or the like which consist of several layers which are connected together on only some of their surfaces, whereby enclosed cavities are formed between the individual layers, characterised in that substances preferably of a fine-grain or powdered nature or also of a liquid or paste consistency are stored in these cavities and are not firmly connected to the layers.
2. Multilayer strips according to claim 1, characterised in that the individual layers between which the cavities are formed have different degrees of mechanical strength so that mechanical stress on the multilayer sheet damages a predetermined surface and the substances stored in the cavities are released.
3. Multilayer strips according to claim 1, characterised in that the individual layers between which the cavities are formed have different degrees of resistance to the effect of moisture and/or heat and so a predetermined surface is damaged by wetting and/or heating and the substances stored in the cavities are released.
4. Multilayer sheets according to claims 1 and 2 or 3, characterised in that the different degrees of mechanical strength or resistance to moisture and/or heat are achieved by selection of different materials for the individual layers and/or by different treatment of the layers during manufacture, especially by creation by pressing or moulding or the like of points or surface areas which can be readily damaged.
5. Multilayer sheets according to claims 1-4, characterised in that one or more of the strips are shaped by moulding, pressing or the like so that cavities of greater thickness are created when the layers are brought together.
6. Multilayer sheets according to claims 1-5, characterised in that all the cavities between the layers are more or less filled with the same substance.
7. Multilayer sheets according to claims 1-5, characterised in that several different substances or different consistencies, granulations or the like of the same substance are contained in different cavities and are more or less mixed together in a predetermined ratio at the time of use.

8. Multilayer sheets according to claims 1-5 and 7, characterised in that the cavities containing different substances etc. are preferably arranged in different layers, so that during use the different substances etc. are released one after the other.
9. Multilayer sheets according to claims 1-8, characterised in that one of the layers, preferably one of the layers to be damaged during use, consists of a material or is impregnated or saturated with a material which during use forms a mixture or a compound with the substances released from the cavities in order to achieve a predetermined effect.
10. Multilayer sheets according to claims 1-9, characterised in that the individual layers are connected to each other in the areas between the cavities by adhesion, stitching, moulding, welding or the like.
11. Multilayer sheets according to claims 1-9, characterised in that the individual layers are connected to each other in the areas between the cavities in such a way that during use the surface connections are also damaged so that the contents of the individual cavities can also be mixed beneath the surface layer to be damaged.
12. Multilayer sheets according to claims 1-11, characterised in that one or more layers are produced by spraying or the like of a suitable material.
13. Multilayer sheets according to claims 1-12, characterised in that the cavities are arranged in such a way that in certain sections of the surface there are perforations or the like between the cavities, allowing predetermined pieces of the sheet to be separated or torn off without damaging or exposing cavities.
14. Process for the manufacture of multilayer sheets according to claims 1-13, characterised in that the treatment of the individual layers (moulding, pressing, etc.), the filling of the cavities and the bringing together of the surfaces are carried out in individual operations one after the other.
15. Process for the manufacture of multilayer sheets according to claims 1-13, characterised in that several or all of the processes necessary to construct the multilayer sheets are combined in one operation.
16. Process for the manufacture of multilayer sheets according to claims 1-13, characterised in that the shaping of one or more layers is done by the effect of a vacuum and/or compressed air.
17. Process for the manufacture of multilayer sheets according to claims 1-13, characterised in that the shaping of the corresponding layer is done by a pattern

applied to the layer and consisting of individual portions of the filler substance being pressed or rolled into the layer.

18. Process for the manufacture of multilayer sheets according to claims 1-13, characterised in that the filling of the cavities or the application of the filler substance to the corresponding layer is done by means of an electrostatic process.

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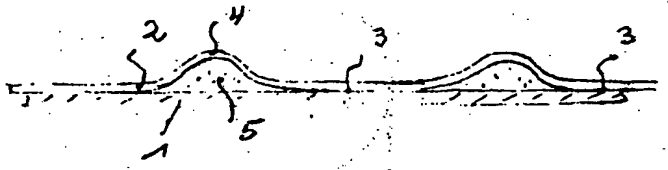

Fig. 1

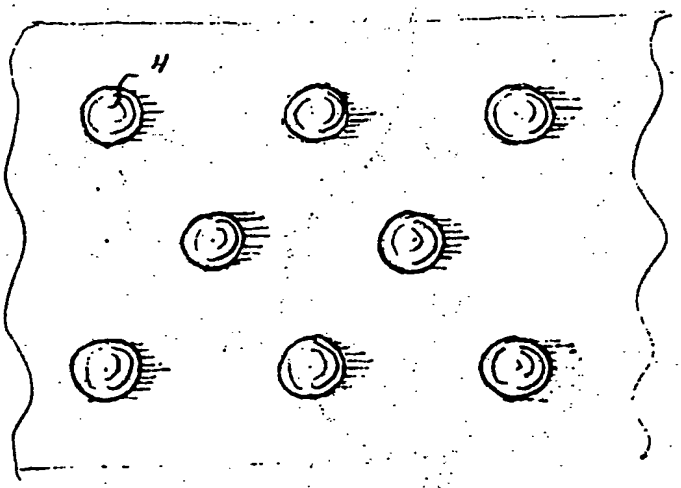

Fig. 2.

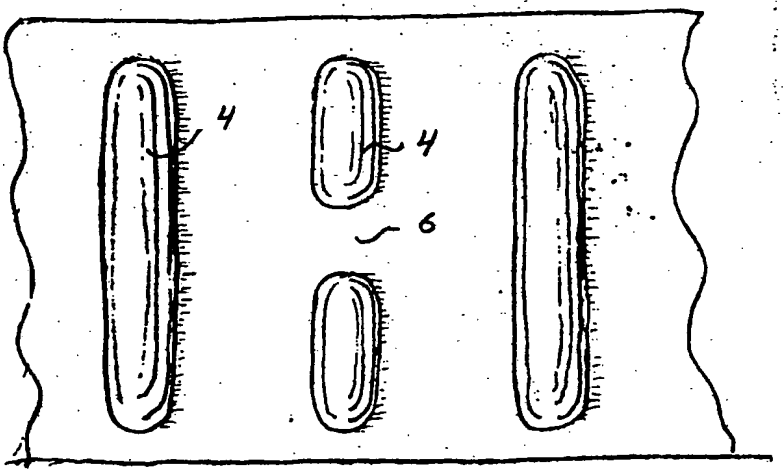

Fig 3.

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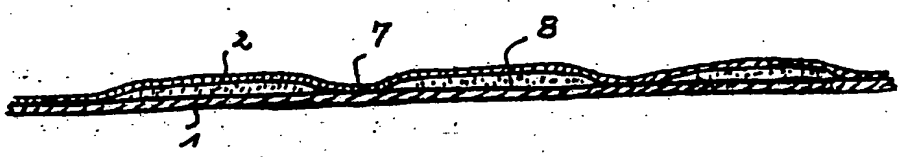

Fig. 4

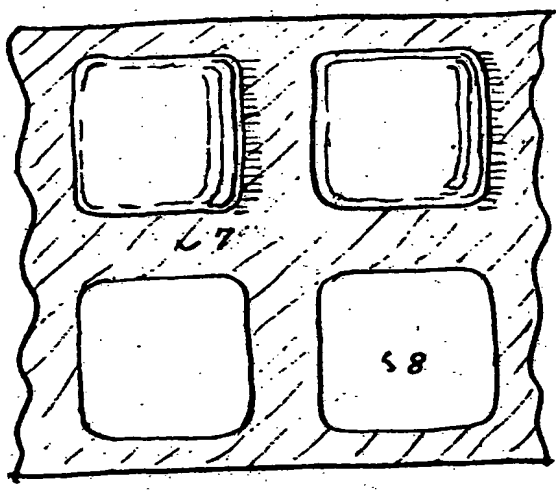

Fig. 5

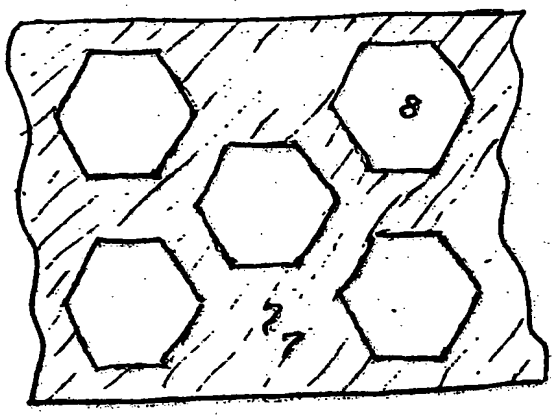

Fig. 6

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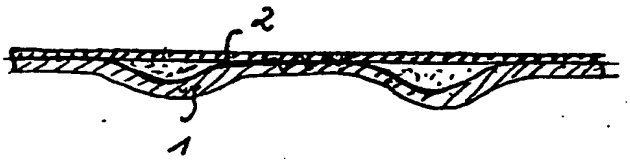

Fig. 7

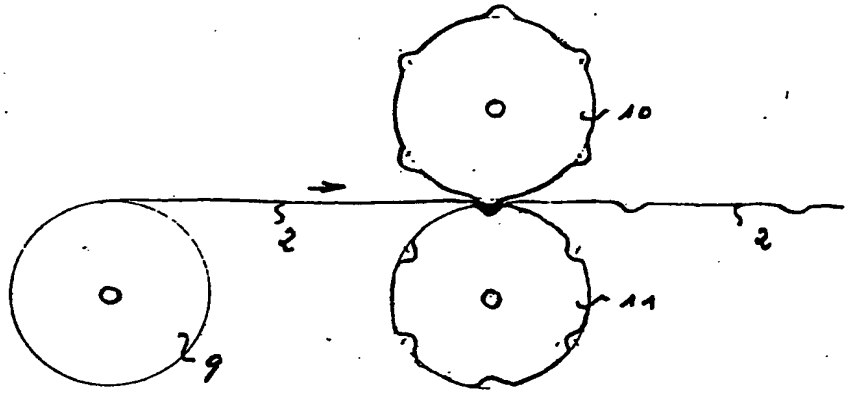

Fig. 8

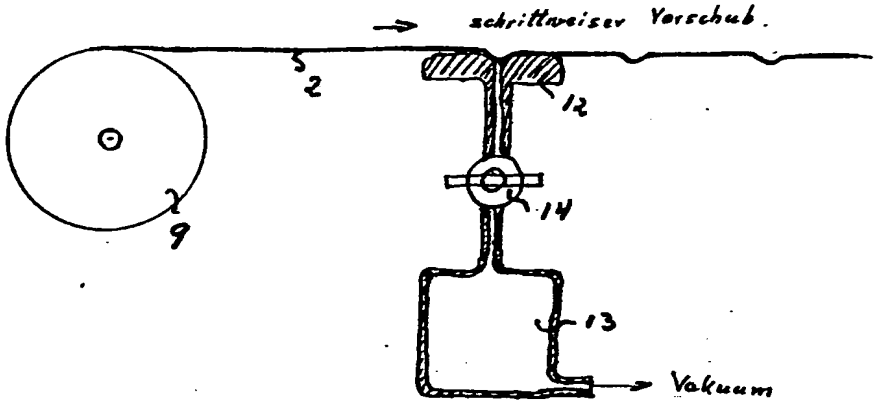

Fig. 9

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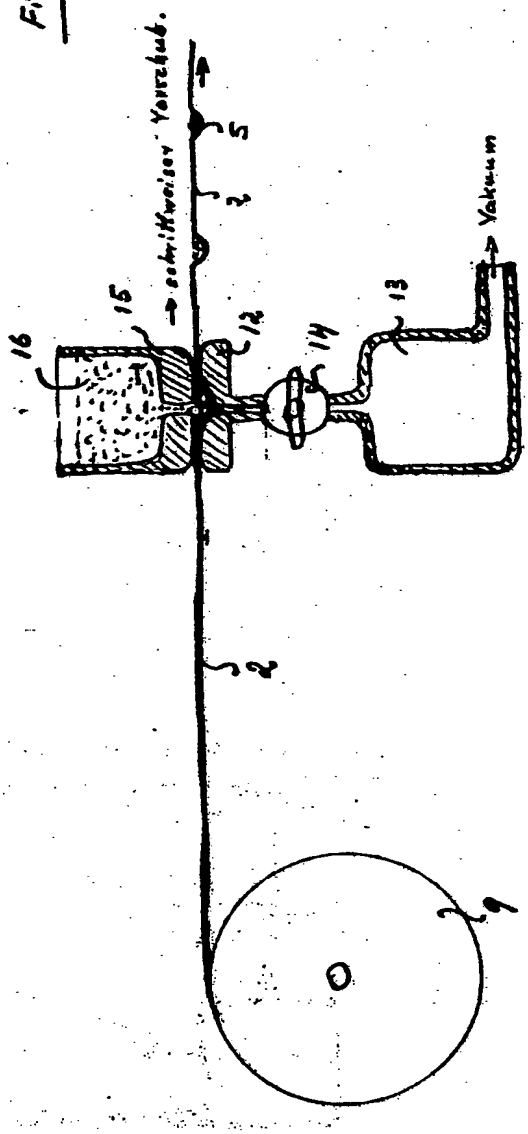
Fig. 10



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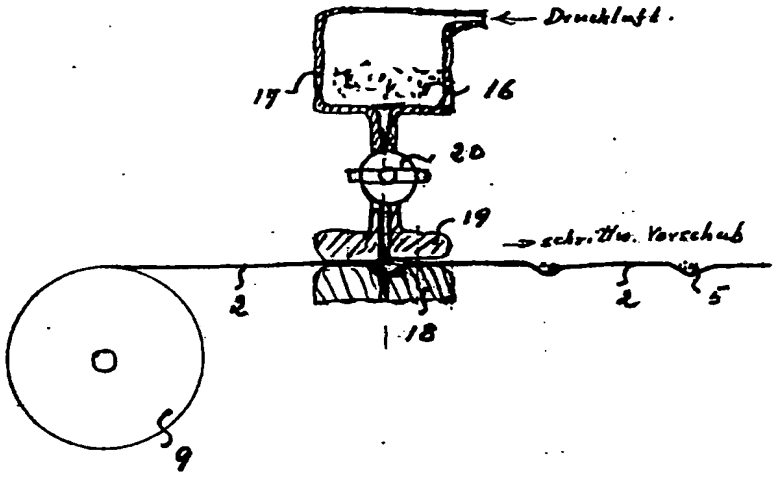

Fig. 1

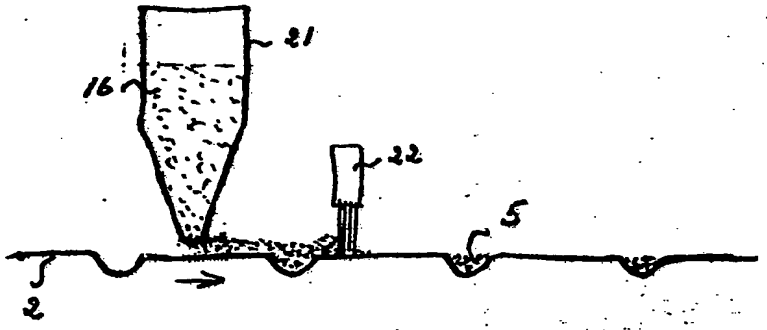

Fig. 2

Fig. 13

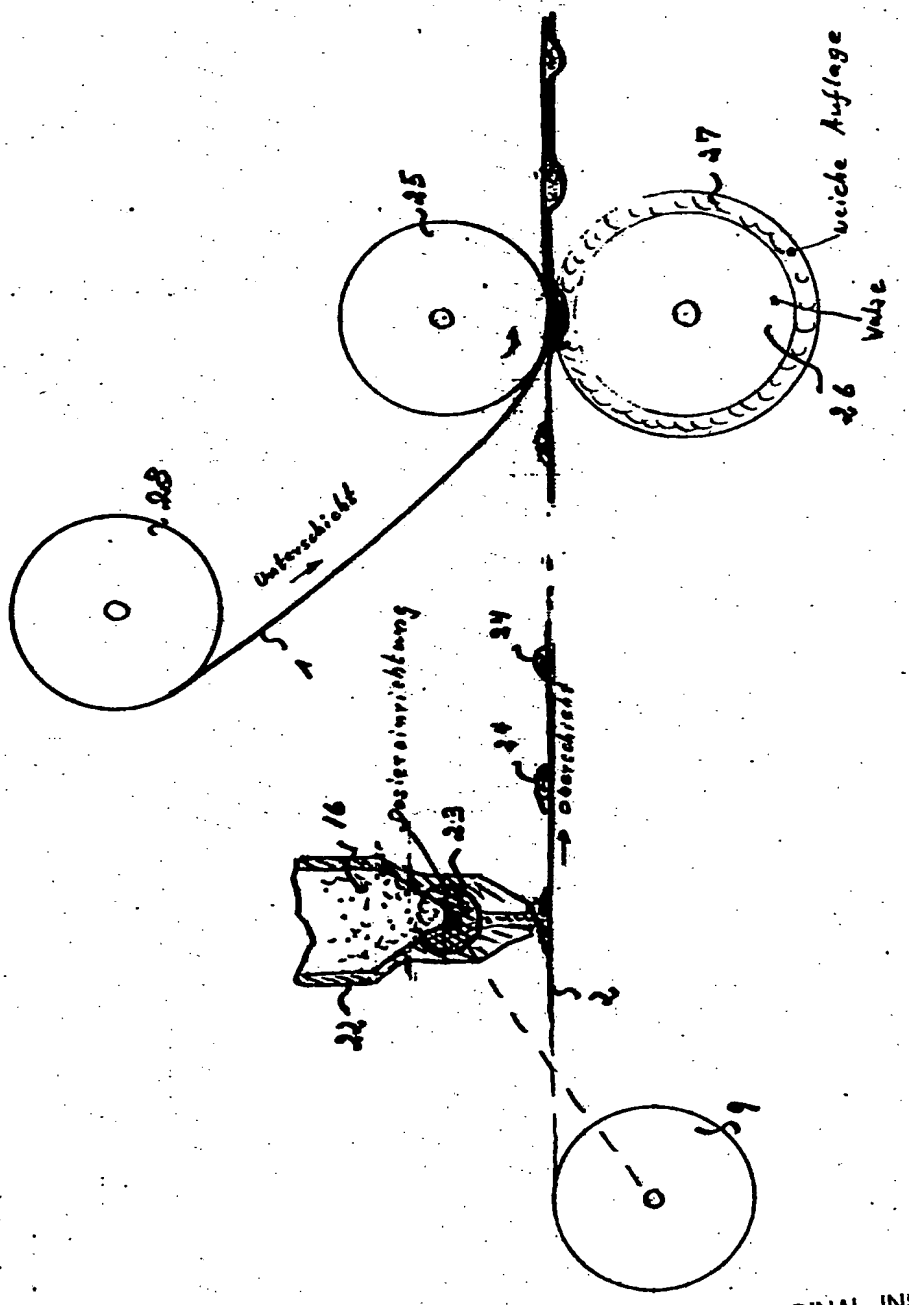

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Fig. 4a